SHORT COMMUNICATION

Estimation of demand for wood panels in Iran by the year of 2012

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Abstract: Considering increasing rate of Iran population and consumption of wood panels, the authors investigated the per capita consumption of wood panels during the years from 1997 to 2007. The exponential smoothing method was used to obtain a per capita consumption pattern of wood panels in Iran for estimating demand of wood panels by the year of 2012. Results show that the consumption of particleboard, fiberboard, and medium density fiberboard in Iran will increase by 33%, 72% and 107 %, respectively, by the year of 2012; however, the consumption of plywood will increase only by 7% by 2012. The deficient amount of wood panels in Iran is estimated over 1400 000 m^3. The results of this study provide the technique reference for planners of wood panel industries in Iran in capital investment decisions.

Keywords: wood panels; exponential smoothing; estimating; Iran; wood panel demand

Introduction

An increasing population will cause an increase of consumption. Considering the ever increasing rate of Iran population, consumption of wood panels is increasing each year. Due to the short of raw material, wood-based panel industries were limited at their nominal capacity. Azizi (2008) suggested that due to the destruction of the forests and lack of proper plantation, replacement of the forest wood by the fast growing wood was vital to satisfy all requirements of factories in Iran. Estimating the future demand for wood panels can help the decision makers to develop long-term programs for this industrial sector. Several methods have been applied to forecast the future demands of wood products. The lumber demand in the United States was forecasted by Alexander et al. (2003) using time series analysis methods. In the present study, we used simple exponential smoothing method to estimate the consumption of wood panels in Iran, as it is more appropriate than a complicated model (ARIMA). The exponential smoothing methods are widely used in business for forecasting demand for inventories (Gardner 1985). They have been also performed surprisingly well in forecasting competitions against more sophisticated approaches (Makridakis et al. 1982; Makridakis et al. 2000). Also the exponential smoothing models for forecasting are common approach in a particular time series (Bil-

lah et al. 2006).

In the following, the present condition of wood panel market is explained briefly based on the data provided by Ministry Of Mines & Industries and Statistics Organization. Amiri (1990) studied the positions of raw materials used in Iran wood industries and determined the rate of production and level of importation of wood raw materials.

State of production, import, export and consumption of particleboard from 1997 to 2007

The particleboard production in 2007 amounted to 718 003 m^3 and dominated over the wood panels' production in Iran. As shown in Table 1, the particleboard production in Iran increased by 87.8% from 1997 (382 322 m^3) to 2007 (718 003 m^3). Also, Howard (2001) reported that consumption amount of particleboard increased by 6.9 % from 1997 to 1999 in USA. The import of particleboard in Iran showed a continued increase trend throughout the 1990s but had a decline by the end of the decade. The export of particleboard increased during the first half of the 1990s. In 2006, 5.02 % of total particleboard production in Iran was exported to the following countries: 66% in volume was exported to Iraq, 18% to Turkmenistan, 7% to Tajikistan, 6% to Afghanistan, and 3% to other countries.

The increased domestic consumption in particleboard leads to the establishment of new factories by using ancient secondhand machines. The estimated consumption of particleboard in 2012 will be 924 533 m^3 and Iran's population is expected to reach 78 281 000 at the same time.

State of import, export and consumption of fiberboard production from 1997 to 2007

The fiberboard production in Iran did not increase from 1996 to 2007 (Table 2), because no plan has been laid out to invest in increasing capacity. Iran exports fiberboard about 7.5% of total

fiberboard production primarily to Afghanistan (35% in volume), Turkmenistan (29%), and Iraq (17%). The proportion of fiberboard importation to fulfill domestic needs is 72%, most of which is imported from China (24%), Turkey (21%), and Spain (13%).

Table 1. The amount of import, export and consumption in particleboard production in Iran **from 1997 to 2007** (m^3)

Year	Production	Import	Export	Consumption
1997	382322	1403	1383	369842
1998	420646	1915	9916	412645
1999	439716	1153	9963.30	430905
2000	409460	130	13374	396216
2001	487774	1553	9752	490575
2002	488542	69035	10265	547312
2003	500947	47876	7898.90	540924
2004	591289	33475	13100	611664
2005	580117	11311	16510	574918
2006	637941	9247	32056	615132
2007	718003	18532	39275	697260

Notes: The data were from Ministry of mines & industries and Statistics organization.

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Table 2. The amount of import, export and consumption for fiberboard production in Iran from 1997 to 2007 (m^3)

Year	Production	Export	Import	Consumption
1997	22526	920	2237	23843
1998	21463	636	1044	21871
1999	21146	700	4495	24941
2000	24708	432	2126	26402
2001	24846	292	3700	28254
2002	22462	730	11605	33337
2003	21407	485	18623	39545
2004	22300	550	17214	38964
2005	23049	610	25060	47499
2006	21031	2123	33704	52612
2007	21100	1594	50355	69861

Notes: The data were from Ministry of mines & industries and Statistics organization

State of import, export and consumption of MDF production from 1997 to 2007

Since MDF was first imported to Iran in 1996, import of MDF panels had increased dramatically from 464 m^3 in 1997 to 497 500 m^3 in 2007 (Table 3). Before 2004, the total of domestic consumption of MDF completely relied on import. In 2004, the first MDF factory was established with an annual capacity of 40 000 m^3 in Iran. By now, 88% of domestic MDF in Iran still relies on import, of which 44% is imported from Turkey, 23% from United Arab Emirates, 10% from China, 6% from Spain, 3% Germany, and 2% from other countries.

Table 3. The amount of import, export and consumption in MDF production in Iran during 1997 to 2007 (m^3)

Year	Production	Export	Import	Consumption
1997	0	0	464	464
1998	0	0	6562	6562
1999	0	0	9407	9407
2000	0	0	21764	21764
2001	0	0	44802	44802
2002	0	0	63680	63680
2003	0	0	140035	140035
2004	26300	0	217081	243381
2005	40426	0	259771	300197
2006	48219	0	351324	399543
2007	70127	0	497500	567627

Notes: The data were from Ministry of mines & industries and Statistics organization

State of import, export and consumption of plywood production from 1997 to 2007

The domestic production has decreased in the recent years, resulting in increased importations (Table 4). This situation is highly associated with the increased demand for tropical plywood in the domestic market. Recently, most of the domestic demand is provided by imports from United Arab Emirates (81%) and Malaysia (10%).

Table 4. The amount of import, export and consumption in plywood production in Iran from 1997 to 2007 (m^3)

Year	Production	Export	Import	Consumption
1997	18581	75	7861	26367
1998	8718	873	14545	22390
1999	7821	1588	4826	11059
2000	9623	1989	13540	21174
2001	8043	3826	8726	12942
2002	6658	1556	19026	24128
2003	6520	525	31682	37677
2004	5006	36	34762	39514
2005	4860	98	27395	32157
2006	5404	430	23471	28445
2007	5365	699	27779	32445

Notes: The data were from Ministry of mines & industries and Statistics organization

Azizi and Faezipour (2006) showed that, based on increasing population, only particleboard would be to replace the plywood; furthermore. Based on per capita construction development, all three products would equally substitute for the plywood.

Method for predication of consumption pattern of wood panels

The data on production capacity and import amount of wood panels during an eleven-year period were obtained from the National Iranian Statistics Institute and Ministry of Industry. The proportion of consumed products to population was calculated using exponential smoothing method.

$\hat{y}_2 = y_1$

$\hat{y}_t + 1 = \hat{y} + \alpha(y_t - \hat{y}_t)$

$\hat{y}_t + 1 = \alpha y_t + (1-\alpha)\hat{y}_t$ for t = 2,3,4,....

where, y_t is the actual value of the time series and $\hat{y}_t$ is the forecasting value for time period t. Like the moving average technique, we cannot tell ahead of time what the best value of α might be; it must be chosen by experimentation (α in this research=0.5).

Results and discussion

Estimation of particleboard demand

From 1997 to 2007, per capita consumption of particleboard in Iran increased by 60% and population increased by 17.7% (Table 5). The estimated demand for particleboard in Iran shows that the total particleboard demand will reach more than 924 533 m^3 in the year 2012 (Table 6), which increases by 33% in comparison with that in 2007. Frazier (1965) indicated that the consumption amount of timber products depended greatly upon population levels.

Table 5.   Per capita consumption of particleboard

Year	Population	Per capita consumption (m^3)
1997	60937000	0.006069
1998	61831000	0.006674
1999	62738000	0.006868
2000	63658000	0.006224
2001	64528000	0.007603
2002	65540000	0.008351
2003	66480000	0.008137
2004	67477000	0.009065
2005	68467000	0.008397
2006	70495000	0.008726
2007	71721000	0.009722

Estimation of fiberboard demand

Per capita consumption of the fiberboard in Iran increased by 1.42 times from 1997 to 2007. The estimated consumption of fiberboard will be 119 900 m^3 in 2012 (Table 6), which increases by 72%, compared to that in 2007.

Estimation of medium density fiberboard (MDF) demand

Per capita consumption of MDF in Iran had a noticeable increase from 1997 to 2007 (Table 3). This consumption level refers to consumer willingness and input of new products in Iran markets. The estimated consumption of MDF will be 1 173 177 m^3 in 2012, which increases by 107%, compared to that in 2007.

Table 6. The estimated consumption of wood panels in Iran from 2008 to 2012   (m^3)

Year	Particleboard demand	Fiberboard demand	Medium density fiberboard	Plywood
2008	736837	78487	674923	32782
2009	781177	88217	792251	33221
2010	827663	98475	915171	33657
2011	875526	109036	1041889	34165
2012	924533	119900	1173177	34593

Estimation of plywood and veneer demand

Although the consumption of plywood increased by 23% from 1997 to 2007 (Table 4), it is estimated the the consumption of plywood will increase by 7% in 2012 (Table 6), compared to that in 2007.

Conclusions

It is estimated that particleboard consumption accounts for nearly 56% of total consumption of wood panels in Iran. Since 1997, the particleboard production growth has remained in a constant portion of wood panels' production. The results of the present study show that the consumption of particleboard, fiberboard, and MDF will increase by 32%, 72%, and 107%, respectively. In 2012, the consumption of plywood will increase only by 7%, compared with that in 2007. The deficient amount of particleboard, fiberboard, and MDF supplies in Iran will be 206 530 m^3, 98 800 m^3, and 1 102 050 m^3, respectively, in volumes, if wood panels' production keeps in the present level.

In the overall scheme of structural wood panels markets, the consumption level of wood panels, especially MDF, will increase in 2012. Particleboard is generally a mature product in Iran while MDF is still gaining market share as new applications. Demand for MDF in Iran is growing, which will be more than particleboard demand in 2012. MDF is also in competition with traditional hardboard markets.

The estimated consumption of wood panels in future provides a base for expanding the present demand in terms of its present level in Iran. According to our results, to encourage the continued development, the Iran wood panel industries require a forestry program providing the raw material needed. If the Iranian wood panel industries satisfy the needs of market, they must (a) provide products desired by the market; (b) provide these prod-

ucts at an expected level of quality and desired amounts by the market; and (c) provide these products with competitive prices.

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